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Saudi Arabia



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Overview

Saudi Arabia has almost one-fifth of the world's proven oil reserves, is the largest producer and exporter of total petroleum liquids in the world, and maintains the world's largest oil production.

Saudi Arabia was the world's largest producer and exporter of total petroleum liquids in 2012, the world's largest holder of crude oil reserves, and the world's second largest crude oil producer behind [Russia](#). Saudi Arabia's economy remains heavily dependent on petroleum. Petroleum exports accounted for almost 90 percent of total Saudi export revenues in 2011, according to the Organization of the Petroleum Exporting Countries (OPEC)'s *Annual Statistical Bulletin 2012*.

Saudi Arabia has been shifting its focus beyond increasing oil production capacity after state-owned oil company Saudi Aramco reached its target of 12 million barrels per day in 2009. With the near-completion of its largest oil projects, Saudi Arabia is expanding its natural gas, refining, petrochemicals, and electric power industries.

Saudi Arabia's oil and natural gas operations are dominated by Saudi Aramco, the world's largest oil company in terms of proven oil reserves and production. Saudi Arabia's Ministry of Petroleum and Mineral Resources and the Supreme Council for Petroleum and Minerals have oversight of the oil and natural gas sector and Saudi Aramco. The Supreme Council, which is composed of members of the royal family, industry leaders and government ministers, is responsible for petroleum and natural gas policy-making, including contract review, as well as Saudi Aramco's strategic planning. The Ministry is responsible for national planning in the area of energy and minerals, including petrochemicals.



Energy Consumption

Saudi Arabia is the largest consumer of petroleum in the Middle East, particularly in the area of transportation fuels and direct burn for power generation. Domestic consumption growth has been spurred by the economic boom as a result of historically high oil prices and large fuel subsidies. Saudi Arabia was the world's 13th largest consumer of total primary energy in 2009, of which about 60 percent was petroleum-based, with natural gas accounting for most of the rest. Saudi Arabia has set a goal of producing almost half of its power from renewable fuels by 2020 in order to meet domestic power needs and to free up oil and natural gas for export. Saudi Aramco's CEO Khalid al-Falih warned that rising domestic energy consumption could result in the loss of 3 million barrels per day (bbl/d) of crude oil exports by the end of the decade if no changes were made to current trends. In the interim, Saudi Arabia is participating in the Gulf Cooperation Council's efforts to link the power grids of member countries to reduce shortages during peak power periods.

Petroleum

Over half of its oil reserves are contained in only eight fields. The giant Ghawar field, the world's largest oil field with estimated remaining reserves of 70 billion barrels, has more proven oil reserves than all but seven other countries.

Reserves

According to the *Oil and Gas Journal*, Saudi Arabia contains approximately 265 billion barrels of proven oil reserves (plus 2.5 billion barrels in the Saudi-Kuwaiti shared Neutral

Zone) as of January 1, 2013, amounting to slightly less than one-fifth of proven, conventional world oil reserves. Although Saudi Arabia has about 100 major oil and gas fields, over half of its oil reserves are contained in only eight fields. The giant Ghawar field, the world's largest oil field with estimated remaining reserves of 70 billion barrels, has more proven oil reserves than all but seven other countries.

Consumption

Saudi Arabia is the largest oil consuming nation in the Middle East. Saudi Arabia consumed approximately 3 million barrels per day (bbl/d) of oil in 2012, almost double 2000 levels, because of strong industrial growth and subsidized prices. Contributing to this growth is rising direct burn of crude oil for power generation, which reaches 1 million bbl/d during summer months, and the use of natural gas liquids (NGL) for petrochemical production. Khalid al-Falih warned that domestic liquids demand was on a pace to reach over 8 million bbl/d (oil equivalent) by 2030 if there were no improvements in energy efficiency.

Production

Saudi Arabia produced on average 11.6 million bbl/d of total petroleum liquids in 2012. In addition to 9.8 million bbl/d of crude oil, Saudi Arabia produced 1.8 million bbl/d of natural gas liquids (NGL) and other liquids. Saudi Arabia, a leading world producer of NGL, has experienced a rise in demand for NGL from developing countries, including India (the leading export destination), where it is used for cooking and transportation.

Saudi Arabia maintains the world's largest crude oil production capacity, estimated at a little less than 12 million bbl/d at the end of 2012 (other petroleum liquids, which are not subject to OPEC quotas or production targets, are produced at full capacity). Saudi Arabia's long-term goal is to further develop its lighter crude oil potential. Although the Ministry has not committed to increasing capacity, potential increases to 15 million bbl/d capacity were discussed at a summit in Jeddah in June 2008.

Saudi crude streams

Saudi Arabia produces a range of crude oils, from heavy to super light. Of Saudi Arabia's total crude oil production capacity, about 65 to 70 percent is considered light gravity, with about 25 percent considered medium gravity, and the rest heavy. The country is moving to reduce the share of the latter two grades. Lighter grades generally are produced onshore, while medium and heavy grades come mainly from offshore fields. Most Saudi oil production, except for extra light and super light, is considered sour, containing relatively high levels of sulfur. Saudi Aramco said that its fields do not require the use of enhanced oil recovery techniques, although fields in the Neutral Zone could require steam flooding.

Decline estimates for Saudi Arabian oil fields vary widely. One industry source (Platts Oilgram, 2006) estimated that the declines rates for existing fields could range from 6 to 8 percent annually, meaning that the country needs about 700,000 bbl/d in additional capacity each year just to compensate for natural decline. The Ministry of Petroleum and Mineral Resources maintains that decline rates in Saudi Arabia are closer to 2 to 3 percent per year. Saudi Aramco has stated that it will conduct additional drilling at existing fields in order to help compensate for the natural declines from the mature fields, and the kingdom is budgeting \$20-\$30 billion over the next 5 years to offset decline rates and maintain current capacity levels.

Major Oil and Gas Fields in Saudi Arabia

	Location	Production/Capacity
Ghawar	onshore	5 million bbl/d of Arab Light crude
Safaniya	offshore	1.5 million bbl/d of Arab Heavy crude
Khurais	onshore	1.2 million bbl/d of Arab Light crude
Manifa	offshore	0.9 million bbl/d of Arab Heavy crude oil after completion. Projected to come online in December 2014
Shaybah	onshore	0.75 million bbl/d of Arab Extra Light
Qatif	onshore	Capacity 500,000 bbl/d of Arab Light crude
Khursaniyah	onshore	500,000 bbl/d Arab Light Crude
Zuluf	offshore	450,000 bbl/d of Arab Medium crude
Abqaiq	onshore	400,000 bbl/d Arab Extra Light crude

Saudi-Kuwait Neutral Zone

The Saudi-Kuwait Neutral Zone (or the Divided Zone), is an area of 2,230 square miles between the borders of Saudi Arabia and [Kuwait](#). The Neutral Zone contains an estimated 5 billion barrels of proven oil reserves that are shared equally between the two countries. Crude oil production has been approximately 600,000 bbl/d, although production declined slightly during the latter half of 2012.

Within the Neutral Zone, [Japan's](#) Arabian Oil Co. (AOC) traditionally operated the two offshore fields of Khafji and Hout with 300,000 bbl/d in production, but in February 2000, AOC lost the concession, and Aramco took over operation of the former AOC fields. ChevronTexaco operates three onshore fields (Wafra, Humma, and South Umm Gudair) in the Neutral Zone under a 60-year license that was renewed in July 2008. These fields had 2 billion barrels of proven reserves as of the end of 2012 and produce about 260,000 bbl/d of Arab Heavy oil. Finally, Bahrain and Saudi Arabia share the 300,000 bbl/d production of the Abu Safah offshore field.

Map of the Saudi - Kuwaiti Neutral Zone





Processing

Saudi Aramco operates the world's largest oil processing facility and crude stabilization plant in the world at Abqaiq, in eastern Saudi Arabia, with a crude processing capacity of more than 7 million bbl/d. The plant processes the majority of Arab Extra Light and Arab Light crude oils, as well as NGL. The facility's infrastructure includes pumping stations, gas-oil separation plants (GOSPs), hydro-desulphurization units, and an extensive network of pipelines that connects the plant to the ports of Ras al-Juaymah, Ras Tanura, and Yanbu (for NGL). Nearly two-thirds of Saudi crude is processed at Abqaiq before export or delivery to refineries. The facility was the target of a terrorist attack in 2006 (see [Security Issues Section](#)).

Refining/petrochemicals

According to the *Oil and Gas Journal*, Saudi Arabia has seven domestic refineries, with a combined crude throughput capacity of about 2.1 million bbl/d (of which Aramco's share is approximately 1.1 million bbl/d). Saudi Arabia continues to integrate its refinery projects with large petrochemicals complexes, in what has been described as the creation of petrochemical cities.

Planned domestic refineries or refineries under development include:

- Saudi Aramco Total Refining and Petrochemical Company (SATORP) in Jubail is a 400,000 bbl/d joint venture with Total that is expected to be fully operational by the end of 2013. It will be an export refinery, run mainly Arab Heavy crude, and maximize production of diesel and jet fuel.

- Yanbu Aramco Sinopec Refining Company (YASREF) Limited, a joint venture with Chinese Petrochemical Corporation (Sinopec), will be able to process up to 400,000 bbl/d of Arab Heavy crude oil from the planned Manifa oil development by the end of 2014.
- Saudi Aramco is developing its 400,000 bbl/d Jazan refinery project in southwest Saudi Arabia. It will be able to process most of Saudi Arabia's crude oil grades by late 2016.
- Saudi Aramco is studying an expansion of its integrated Petro Rabigh Refinery and petrochemical joint venture, which currently has a capacity of 400,000 bbl/d.

Saudi Arabia has also initiated a number of clean fuels projects to provide more ultra-low sulfur diesel fuel. These include the upgrades at the refineries at Yanbu in mid-2013 and Jubail by the end of 2013.

Overseas refining investments

Saudi Arabia has approximately 2 million bbl/d of refining capacity overseas through joint and equity ventures in facilities in the United States, [China](#), [South Korea](#), Japan, and the Philippines. In the United States, Saudi Aramco and partner Royal Dutch/Shell own three Motiva joint-venture refineries in Louisiana and Texas. The three facilities currently have a total capacity of about 740,000 bbl/d. Saudi Aramco owns 50 percent of Motiva through a subsidiary, Saudi Refining.

Security issues

The Saudi petroleum pipeline and export network (and energy sector in general) has been a terrorist target in the past. In February 2006, Saudi security prevented an attempted suicide bomb attack at the Abqaiq petroleum processing facility, after Al-Qaeda leadership called for renewed attacks against the country's economic backbone. Following the 2006 incident, the government increased the National Guard and military security force to approximately 20,000 guards, in addition to the 5,000 guards employed directly by Saudi Aramco. In addition to direct security, Saudi Arabia is known to ensure export security by maintaining "redundancy" (i.e., multiple options for transportation and export) in its oil system, in part as a form of indirect security against any one facility being disabled.

Oil exports and shipping

Although Far East Asia is received an estimated 54 percent of Saudi Arabia's crude oil exports in 2012, Saudi Arabia still ranked second after Canada as a petroleum exporter to the United States.

Exports

Saudi Arabia exported an estimated 7.5 million barrels per day (bbl/d) of crude oil in 2012. Far East Asia received an estimated 54 percent of Saudi Arabia's crude oil exports, as well as the majority of its refined petroleum product and natural gas liquids (NGL) exports.

Saudi Arabia exported an average of 1.4 million bbl/d of total petroleum liquids to the United

States through the first 10 months of 2012 (up from 1.2 million bbl/d for calendar year 2011), accounting for 16 percent of total U.S. crude oil imports. Saudi Arabia ranked second after [Canada](#) during that time as a petroleum exporter to the United States. Other major Saudi customers in 2012 included Japan (1.1 million bbl/d), China (1.1 million bbl/d), South Korea (0.8 million bbl/d), and [India](#) (0.7 million bbl/d).

In January 2010, Saudi Arabia changed the benchmark that it uses for pricing crude oil exports to the United States. Saudi Arabia, which had used the West Texas Intermediate (WTI) crude oil price since 1994, switched to the Argus Sour Crude Index (ASCI), in part because the ASCI is viewed as being more representative of the U.S. Gulf Coast sour crude market.

Major ports

Saudi Arabia has three primary oil export terminals:

- The Ras Tanura complex on the Persian Gulf has approximately 6 million bbl/d capacity, and it is the world's largest offshore oil loading facility. It includes the 2.5-million bbl/d port at Ras Tanura. More than 75 percent of Saudi Arabia's oil exports are loaded at the Ras Tanura Facility.
- The Ras al-Ju'aymah facility on the Persian Gulf has a capacity of 3-3.6-million bbl/d.
- The Yanbu terminal on the Red Sea, from which most of the remaining volumes are exported, has a loading capacity of approximately 4.5 million bbl/d crude and 2 million bbl/d for NGL and products. The facility is reportedly not used to full capacity.

In addition, Saudi Arabia has a dozen other smaller terminals throughout the country.

Major domestic petroleum pipelines

Saudi Aramco operates more than 9,000 miles of petroleum pipelines throughout the country, including two major pipelines:

- Saudi Arabia has the 745-mile-long Petroline, also known as the East-West Pipeline, which runs across Saudi Arabia from its Abqaiq complex to the Red Sea. The Petroline system consists of two pipelines with a total nameplate capacity of about 4.8 million bbl/d. The 56-inch pipeline has a nameplate capacity of 3 million bbl/d and its current throughput is about 2 million bbl/d. The 48-inch pipeline had been operating in recent years as a natural gas pipeline, but Saudi Arabia moved to convert it back to an oil pipeline. The switch would increase Saudi Arabia's spare oil pipeline capacity to bypass the Strait of Hormuz from 1 million bbl/d to 2.8 million bbl/d, which is only attainable if the system is able to operate at its full nameplate capacity.
- Running parallel to the Petroline is the 290,000-bbl/d Abqaiq-Yanbu natural gas liquids (NGL) pipeline, which serves Yanbu's petrochemical plants.

Also built in the 1980s was a 236-mile multi-products line between Dhahran in the Eastern Province and Riyadh and a smaller 220-mile multi-product line between Riyadh and Qassim to the north.

International petroleum pipelines

Saudi Aramco does not operate any major functioning international pipelines.

- The Trans-Arabian Pipeline (Tapline) from Qaisumah to Sidon, Lebanon, completed in 1947, has been closed, in part, since 1984 (the portion to Jordan was closed in 1990, although there has been talk of reopening this portion).
- The 1.65 million-bbl/d, 48-inch Iraqi Pipeline in Saudi Arabia (IPSA), which runs parallel to the Petroline from pump station #3 (there are 11 pumping stations along the Petroline) to the port of Mu'ajjiz, just south of Yanbu, was built in 1989, but closed indefinitely following the August 1990 Iraqi invasion of Kuwait. In June 2001, Saudi Arabia seized ownership of IPSA. Theoretically, IPSA could be used for Saudi oil transport to the Red Sea, although the Saudis have reported that the pipeline has been converted to carry gas as part of the Master Gas System.

The only functioning international crude pipeline system is a 60-year old complex of four small submarine pipelines carrying Arabian Light crude from the Abu Safah and Dammam fields to Bahrain. The pipelines capacities range from 207,000 to 250,000 bbl/d. This aging pipeline system is expected to be decommissioned after the construction of the New Arabia pipeline, a 71-mile, 350,000-450,000-bbl/d capacity feed running between Abqaiq and Bahrain's refinery at Sitra.

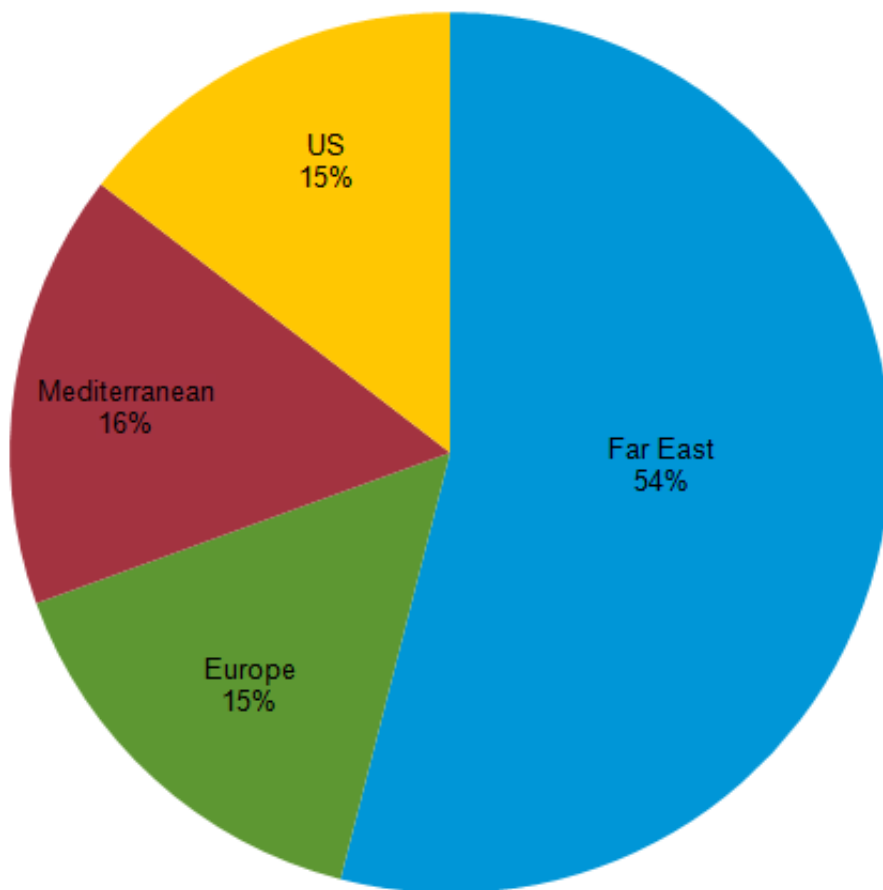
Shipping

Saudi Aramco's shipping subsidiary, Vela International Marine Ltd., operates 15 VLCCs (very large crude carriers) and five product tankers performing coastal trade in the Red Sea and the Persian Gulf. Vela also has a large number of VLCCs and product tankers employed on time or spot charters. In addition to tankers, Saudi Aramco owns or leases oil storage facilities around the world, in Rotterdam, Sidi Kerir (the Sumed pipeline terminal on Egypt's Mediterranean coast), South Korea, the Philippines, and the [Caribbean](#).

The National Shipping Company of Saudi Arabia, known as Bahri (formerly NSCSA), is a public company that owns and operates a modern fleet of 17 VLCCs, 22 chemical tankers, and other cargo ships. The Public Investment Fund (PIF) of the Saudi government holds 28 percent, while the remaining 72 percent is publicly traded.

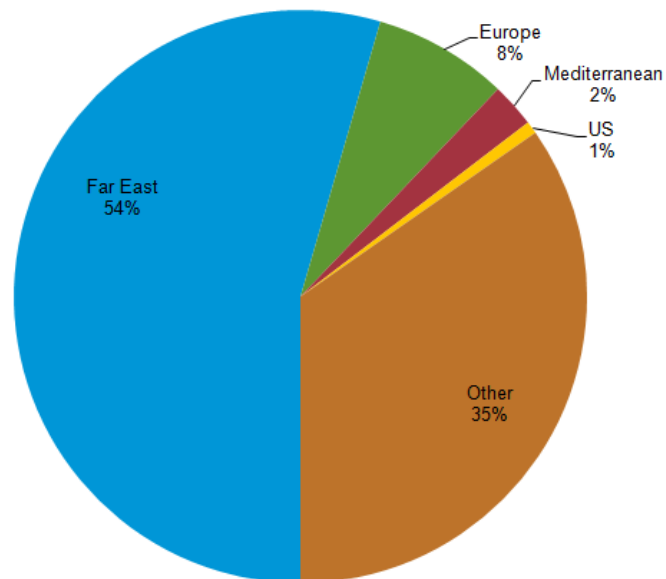
The Bahri and Vela companies announced in June 2012 that they signed a non-binding memorandum of understanding (MOU) to pursue the merger of their fleets and operations. Management responsibility for Saudi Aramco's VLCC transportation system would be implemented within the corporate structure of Bahri. Under a merger, Bahri would become the fourth-largest owner of VLCCs globally.

Saudi crude oil exports by destination (2012)

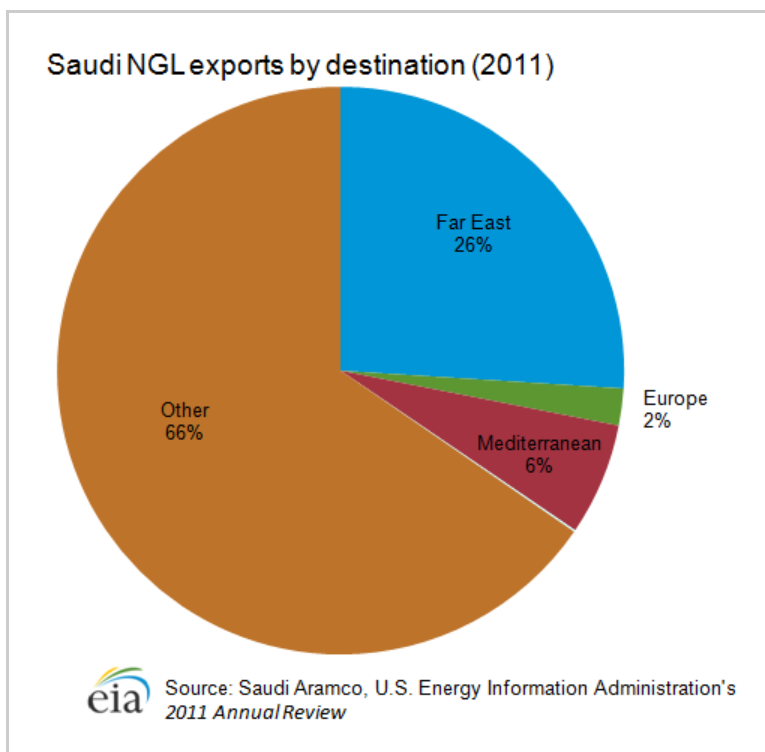


Source: U.S. Energy Information Administration, APEX

Saudi refined product exports by destination (2011)



Source: Saudi Aramco, U.S. Energy Information Administration's 2011 Annual Review



Natural gas

Saudi Arabia has the world's fifth largest natural gas reserves, but natural gas production remains limited.

Reserves

Saudi Arabia (including the Neutral Zone) had proven natural gas reserves of 288 trillion cubic feet (Tcf) at the end of 2012, fifth largest in the world behind Russia, [Iran](#), [Qatar](#), and the United States, according to EIA estimates. About 5 Tcf was added in 2012, and over the last decade, Saudi Arabia added over 60 Tcf of natural gas reserves.

The majority of gas fields in Saudi Arabia are associated with petroleum deposits, or found in the same wells as the crude oil, and production increases of this type of gas remain linked to an increase in oil production. About 57 percent of Saudi Arabia's proven natural gas reserves consists of associated gas at the giant onshore Ghawar field and the offshore Safaniya and Zuluf fields. The Ghawar oil field alone accounts for approximately one-third of the country's proven natural gas reserves. According to Saudi Aramco, only 15 percent of Saudi Arabia has been "adequately explored for gas."

Production and consumption

Saudi Arabia does not import or export natural gas, so all consumption must be met by domestic production. According to Saudi Aramco forecasts, natural gas demand in the Kingdom is expected to almost double by 2030 from 2011 levels of 3.5 trillion cubic feet (Tcf) per year.

Rapid reserve development is necessary for Saudi Arabia's plans to fuel the growth of the petrochemical sector, as well as for power generation and for water desalination. All current

and future gas supplies (except natural gas liquids) reportedly remain earmarked for domestic use, in part to minimize the use of crude oil for power generation. However, natural gas production remains limited, as soaring costs of production, exploration, processing, and distribution of gas have squeezed supply. OPEC estimates that 13 to 14 percent of total production is lost to venting, flaring, reinjection and natural processes.

Pricing

In addition to facing domestic supply shortages, Saudi Arabia has also come under pressure internationally for its subsidized natural gas prices, which are among the lowest in the Persian Gulf region. These low prices were set when most of Saudi Arabia's gas production came from inexpensive associated gas, but they are inconsistent with the much more expensive high-sulfur gas production coming from offshore fields.

Upstream developments and strategy

Although most of its natural gas reserves are from associated gas, Saudi Arabia is not likely to boost its gas production from associated gas reserves in the near future because it has completed its recent major oil development phase, and shifted its attention to natural gas and downstream petroleum activities. To meet growing domestic needs for additional production, the Petroleum Ministry and Saudi Aramco announced a \$9-billion strategy to add 50 Tcf of non-associated reserves by 2016 through new discoveries (and potentially another 50 Tcf of associated reserves).

Saudi Aramco has focused heavily on major offshore gas developments in the Persian Gulf. Exploration and development will also commence in non-producing areas such as the Red Sea, northern and western Saudi Arabia, and the Nafud basin, north of Riyadh. In order to access Saudi Arabia's unconventional gas resources, Saudi Aramco also launched its Upstream Unconventional Gas program in 2011.

Upstream developments by Saudi Aramco

Saudi Aramco has focused on offshore fields in the Persian Gulf in its current 5-year plan to expand its natural gas production. Three non-associated gas fields have been targeted:

- The Karan gas field, discovered in 2006, is Saudi Arabia's first offshore non-associated gas development. The Karan field came online in 2011 and is expected to produce 1.8 billion cubic feet per day (Bcf/d) of sour gas that will be delivered via a 110-kilometer subsea pipeline to the Khursaniyah Gas Plant.
- The 1.2 Bcf/d Arabiyah gas field is expected online within 5 years.
- The 1.3 Bcf/d Hasbah gas field is expected online within 5 years.

The Arabiyah and Hasbah fields are believed to contain high-sulfur natural gas that will be processed at the Khursaniyah gas plant. The high sulfur levels of these gases, as well as the offshore location, will make them relatively expensive to develop.

In response to these new upstream developments, a major expansion of natural gas and natural gas liquids processing capacity from 9.3 Bcf/d to 12.5 Bcf/d is underway at Khursaniyah, Hawiyah, Ju'aymah, Yanbu, and Khurais to process increases in production.

Saudi Arabia is also building a 2.5 Bcf/d Wasit Gas Plant, which will be one of the largest gas plants Saudi Aramco has ever built. It has a target completion date set at mid-2014. This plant will receive gas from the Arabiyah and Hasbah fields.

Upstream activities in contested regions

Plans to develop the offshore Dorra field (located in the uncontested Saudi-Kuwait Neutral Zone) jointly with Kuwait have met with opposition because a small portion of that field is also claimed by Iran, who refers to it as the Arash field. In addition, some of the maritime borders with Kuwait and Iran remain un-demarcated. Saudi Arabia reached an agreement with Kuwait in July 2000 to share Dorra output equally. According to Saudi Aramco, the field is estimated to contain non-associated natural gas reserves of between 35 and 60 Tcf, and the field is under seismic study. The Kuwaiti Ministry of Oil has reported that the goal is to initially produce 600 million cubic feet per day (MMcf/d) from Dorra.

Upstream activities in the empty quarter (Rub al-Khali)

The Saudi domestic natural gas market, traditionally the sole domain of Saudi Aramco, is slowly being opened to private investment both in exploration and distribution, and increasing competition in the market. The backbone of the non-associated gas exploration strategy relies on foreign consortiums exploring for onshore gas and condensate (natural gas liquids) in the Rub al-Khali, which encompasses most of the southern third of Saudi Arabia.

Saudi Arabia has four upstream joint ventures in the Empty Quarter:

- South Rub al-Khali Company or SRAK (a venture of Saudi Aramco and Royal Dutch Shell)
- Luksar Energy Limited (a venture of Saudi Aramco and Lukoil)
- Sino Saudi Gas Limited (a venture of Saudi Aramco and Sinopec)
- EniRepSa Gas Limited (a consortium of Saudi Aramco, Eni, and Repsol-YPF)

To date, these ventures have not made significant commercial discoveries, in part because development costs would be far higher than Saudi Arabia's official domestic gas price. SRAK received approval for an appraisal program for the Kidan sour gas field, which holds about 7 Tcf of high sulfur gas.

Domestic gas pipelines

Domestic demand for natural gas, particularly the delivery feedstock to petrochemical plants, has driven consistent expansion of the Master Gas System (MGS), the domestic gas distribution network in Saudi Arabia first built in 1975. Prior to the MGS, all of Saudi Arabia's natural gas output was flared. The MGS feeds gas to the industrial cities including Yanbu on the Red Sea and Jubail.

In order to feed the expanded gas processing facilities, several additions to the MGS are in the planning or construction phases. The largest pipeline to be built is the 132-mile conduit to the Rabigh complex and the Yanbu NGL processing facility. Installation of four other pipelines will connect Manifa to KGP and Ras az-Zour for gas processing and raw power production. These additions are a part of a broader expansion of the existing gas transmission system in Saudi Arabia, reportedly to include the construction of around 1,200 miles of additional natural gas pipeline capacity.

Electricity

Saudi Arabia plans to increase generating capacity from 55 gigawatts (GW) to 120 GW by 2020 in order to meet a rapidly growing demand for electricity.

Like many developing countries in the [Middle East and North Africa](#), Saudi Arabia faces a sharply rising demand for power. Demand is driven by population growth, a rapidly expanding industrial sector led by the development of petrochemical cities, high demand for air conditioning during the summer months, and heavily subsidized electricity rates. Saudi Arabia has the largest expansion plan in the Middle East for generation, as it plans to increase generating capacity from 55 GW to 120 GW by 2020, with further increases planned by 2032. All generating capacity is thermal (powered by hydrocarbons such as crude oil and fuel oil), but Saudi Arabia plans to diversify fuels used for generation, in part to free up oil for export. The planned 2020 capacity totals include 55 GW of renewable fueled capacity, of which 41 GW will be solar. Planned generation increases to 2032 include 17 GW of nuclear power as well as efficiency increases designed to eliminate the need for an additional 37 GW of capacity.

Sector organization

The Saudi Electric Company (SEC) is the largest provider of electricity in the kingdom. However, it is not the only one. The state-owned Saline Water Conversion Corporation (SWCC), which provides most of the kingdom's desalinated water, is the second largest generator of electricity. SWCC plans to rapidly increase its desalination capacity, and its generation capacity will increase accordingly. Privately-owned independent water and power plants also provide electricity to the grid. In the near future, state-owned Saudi Aramco will also be allowed to sell power to SEC. Saudi Aramco already builds power plants for its own needs and will add further capacity through a variety of cogeneration heat and power plants.

Saudi Arabia is moving to create a more competitive power market through a series of physical and regulatory changes. The Electricity and Cogeneration Regulatory Authority (ECRA) issued new rules, expected to be effective by the end of 2013, that will allow companies such as Saudi Aramco to initially sell power to SEC and later directly to customers. SEC itself will be split into three national companies for generation, transmission, and distribution, with the generation company to be further split into four companies that will be able to sell power to the SEC's transmission company, with the ECRA setting the rules for using the transmission grid.

Physical improvements will also be needed to allow more companies to sell power to the grid. SEC is targeting 2016 to complete upgrades to its transmission system, including a major new link connecting the eastern grid to the grid in the western region. In order to meet peak demand requirements, Saudi Arabia is participating in the Gulf Cooperation Council's efforts to link the power grids of member countries. The kingdom has also discussed a 3-GW link with [Egypt](#), whose peak hours vary from those of Saudi Arabia, and it is also considering a connection to European power grids. Upgrades to a smart grid in the future would also enable the kingdom to better handle intermittent power generation from renewable sources.

Notes

- Data presented in the text are the most recent available as of February 26, 2013.
 - Data are EIA estimates unless otherwise noted.
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